

POSSIBLE HUMAN-ASSISTED DISPERSAL OF *LEVANTINA SPIRIPLANA* (PULMONATA: HELICIDAE) IN WESTERN TURKEY

by Aydin Örstan\*)

**Abstract:** Three new disjunct records of the land snail *Levantina spiriplana* from western Turkey are given. One record is from an antique city and the other two are from inland areas that had access to the Aegean in the antiquity. The distribution pattern suggests that the species was introduced to these locations by humans.

**Key words:** land snail, zoogeography, introduced species

The intertwined ranges of *Levantina spiriplana spiriplana* (Olivier 1801) and *L. spiriplana malziana* (Pfeiffer 1861) in southwestern Turkey and on the adjacent Greek islands create a challenging zoogeographic puzzle (Glaubrecht, 1993). To pave the way to a solution, I give new records of *L. spiriplana* from three disjunct areas considerably outside the previously known range of this species in Turkey (the GPS coordinates of all the stations are available upon request).

The first station was the ruins of the Carian city of Euromus (Fig. 1), where I collected three adult shells on 9 August 2000. These specimens are with the Carnegie Museum of Natural History, Pittsburgh, PA, USA (CM 63631). The shells have closed umbilici and belong to the subspecies *L. spiriplana malziana*.

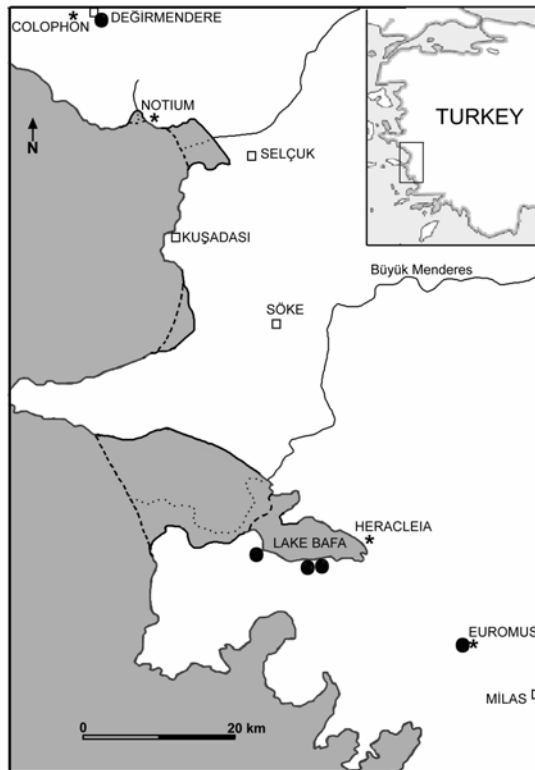


Figure 1. The survey area as it would have appeared about 2000 years ago before the river deltas were closed. Filled circles: *L. spiriplana* collection stations; stars: antique cities mentioned in the text; squares: some present cities; broken lines: present shoreline; dotted lines: present courses of rivers.

The second location comprises a series of three stations with limestone rocks along the southern coast of Lake Bafa (Fig. 1), where I collected two adult and several juvenile shells in August 1998, 2000 and 2002. The umbilicus of one adult is fully closed, whereas that of the other adult is partially closed, apparently because of a malformed callus. I am classifying both as *L. spiriplana malziana*. In the antiquity, the closest city to these stations was Heracleia to the northeast (Bean, 1979). Until about 2000 years ago, Lake Bafa was a bay open to the Aegean Sea. But the gradual filling of the Büyük Menderes (the ancient Meander) delta with alluvium closed the connection of the bay with the sea and turned it into a lake (Göney, 1975; Kraft et al, 1985). Today, the southern shore of Lake Bafa is a long flat beach without large rocks. If the shore had the same topography in the antiquity when it was still connected to the sea, it would have been a suitable place for the landing of small boats to disembark their cargo.

The third station was the opening of a narrow cave at the base of a limestone cliff south of the town of Degirmendere (Fig. 1). Based on the presence of a keel and the typical patterns on it, I identified an empty subadult shell from this station as *L. spiriplana* (CM 68057). However, because the umbilicus of the shell is completely open, I cannot place it in either of the subspecies. This appears to be the northernmost record of this species. This station is near the ruins of the ancient Ionian city of Colophon. In addition, ~14 km to the southeast and by the Aegean are the ruins of the city of Notium, which was the harbor for Colophon (Bean, 1979). Furthermore, between these two cities is another prograded delta, that of the Ahmetbeyli Stream (the ancient Halesus). Before the delta was filled with alluvium, the harbor may have been ~2 km further up north, closer to Colophon (Kayan, 1996).

I have collected at many more stations in between these three areas, but did not find *L. spiriplana* elsewhere. The three disjunct colonies of *L. spiriplana* may have resulted from the fragmentation and shrinkage of a wider distribution range it had in the past. However, because the stations were at or near antique cities and two seem to have had access to the sea in the antiquity, a more plausible explanation is that *L. spiriplana* was introduced to these stations by humans.



Fig. 2: A juvenile *Helix aspersa* (left) and an adult *Levantina spiriplana malziana* (diameter: 34.2 mm) aestivating attached to a limestone rock found in a rock pile, eastern Bodrum Peninsula, Turkey, 10 August 2002.

I will discuss two possible routes of introduction of *L. spiriplana*. The first is the deliberate introduction of *L. spiriplana* for food. *Levantina* species have been eaten by humans (Bar, 1977; Mienis, 1985). The idea that *L. spiriplana* may have been introduced as food to Rhodes from the Middle East has been around for some time (for citations, see Glaubrecht, 1993). Second, the snails may have been inadvertently transported on rocks. Welter-Schultes (1998) suggested that some *Albinaria* species that aestivate on rocks in Crete may have been carried to places outside their natural ranges on rocks used for construction or as ballast in ships. In and around the ruins of Notium there is another species, *Albinaria lerosiensis*, that exists outside its original range (Bodrum Peninsula). I have already considered the possible introduction on rocks of this species to the Notium area (Örstan, 2001). *Levantina spiriplana* also aestivates on rocks (Fig. 2). Therefore,

ancient mariners could have inadvertently transported this species on ballast rocks or on marble for buildings to places like the southern shore of Lake Bafa and the Notium-Colophon area.

Further surveys in Turkey are necessary to better understand the historical factors behind the present day distributions of these *Levantina* subspecies.

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**Note: This electronic version contains four additional sentences that were inadvertently deleted during the printing of the paper version. It also differs slightly in formatting and has Fig. 2 in color.**